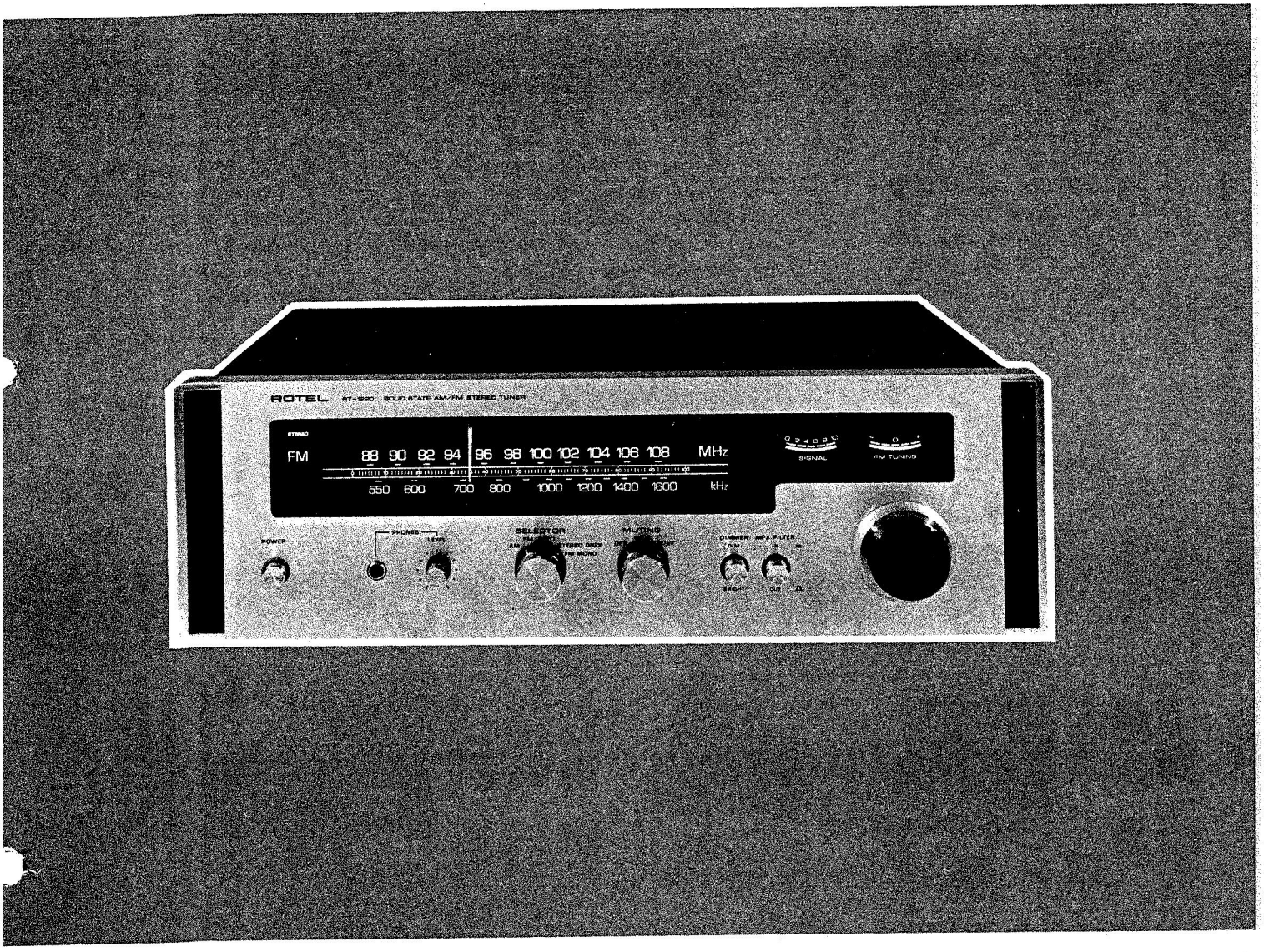
ROTEL®

RT-1220

AM/FM STEREO TUNER



technical manual

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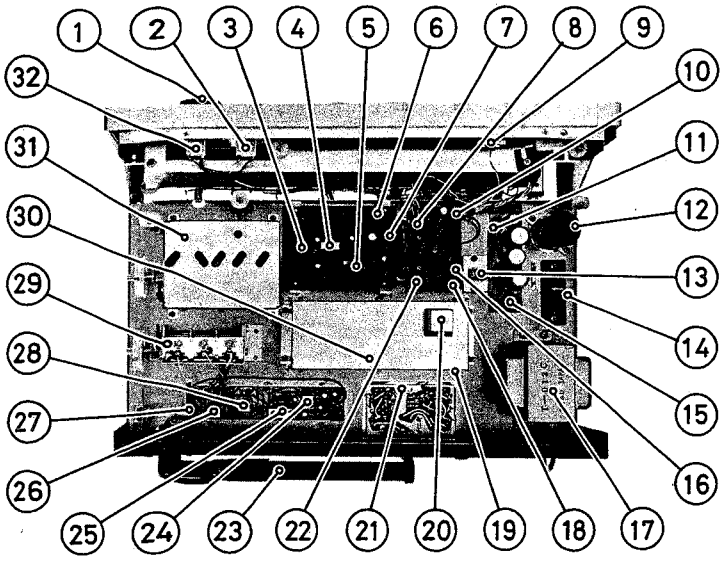
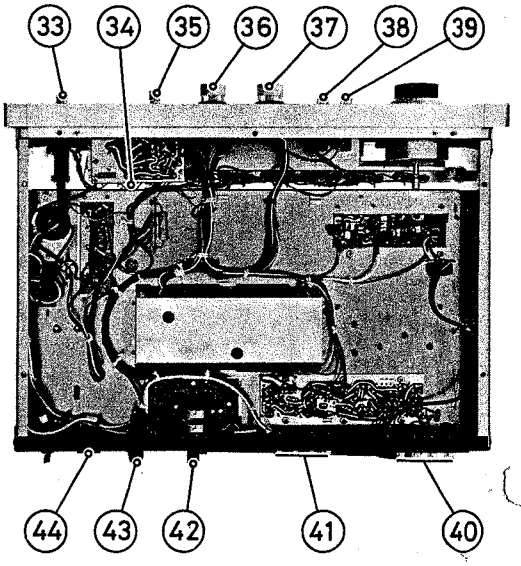
CHASSIS LAYOUT

1. Tuning Knob
2. FM Tuning Meter, M001
3. MPX 38KHz Filter, L302
4. De-emphasis Switch, S-2
5. MPX Coil 19KHz/38KHz Tune, L301
6. FM MPX Circuit Board
7. FM Stereo Separation Adj., VR301
8. Muting Level Adj., VR802
9. Dial Pointer
10. Signal Meter Level Adj., VR801
11. Rectifier Circuit Board
12. Ripple Filter Capacitor, C005
13. Stabilizer Transistor, Q901
14. Voltage Selector
15. Rectifier, D902
16. Muting Coil, L801
17. Power Transformer, T001
18. Muting Circuit Board
19. FM IF Amp. Circuit Board
20. FM IFT, Ratio Detector, T101
21. Audio Amp. Circuit Board
22. Muting Level Adj., VR803
23. AM Antenna Coil. L003
24. AM IFT, T204
25. AM Bandpass Filter, T203
26. AM RF Coil, T201
27. AM Conv. and IF Amp. Circuit Board
28. AM Oscillator Coil. T202
29. AM Variable Capacitor
30. FM Mono-Stereo Switching Level Adj., VR101
31. FM Front End
32. Signal Meter, M002
33. Power Switch, S-1
34. Headphone Amp. Circuit Board
35. Phones Level Control, VR401
36. Selector Switch, S-5
37. Muting Switch, S-6
38. Dimmer Switch, S-4
39. MPX Filter Switch, S-3
40. Antenna Terminal Strip
41. Output Jack
42. Output Level Control, VR501
43. Fuse Holder
44. AC Outlet





PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors and IC.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.

AM ALIGNMENT PROCEDURE

Instruments: AM Signal Generator, AC VTVM and Harmonics Distortion Analyzer.

NOTES: Set Selector switch to AM.

Input signal must be kept as low as possible to avoid AVC action, except Step 5.

Step	Generator		Tuning Dial Setting	Output Indicator Connected to	Adjust	Adjust for
	Coupling	Frequency				
1	VC2 (Hot end) through a 0.01 mfd capacitor. See Fig. 1	455KHz (400Hz 30% Mod.)	Non interfering at low end of scale.	AC VTVM to OUTPUT jack (Left or Right)	T204 and T203 (on AM IF board)	Maximum reading on VTVM.
2	Connect to short loop of wire. Radiate signal into ferrite loop-stick antenna.	600KHz (400Hz 30% Mod.)	600KHz		T202 (OSC) T201 (RF) (on AM IF board) and L003 (ANT)	
3		1400KHz (400Hz 30% Mod.)	1400KHz		CT3 (OSC) CT2 (RF) and CT1 (ANT) (on AMVC)	
4	*Repeat steps 2 and 3 until no further improvement is noticed.*					
5	Same as in Step 2. Antenna Input level 5mV.	1000KHz (400Hz 30% Mod.)	1000KHz	Distortion Analyzer to OUTPUT jack	T204	Minimum Distortion.

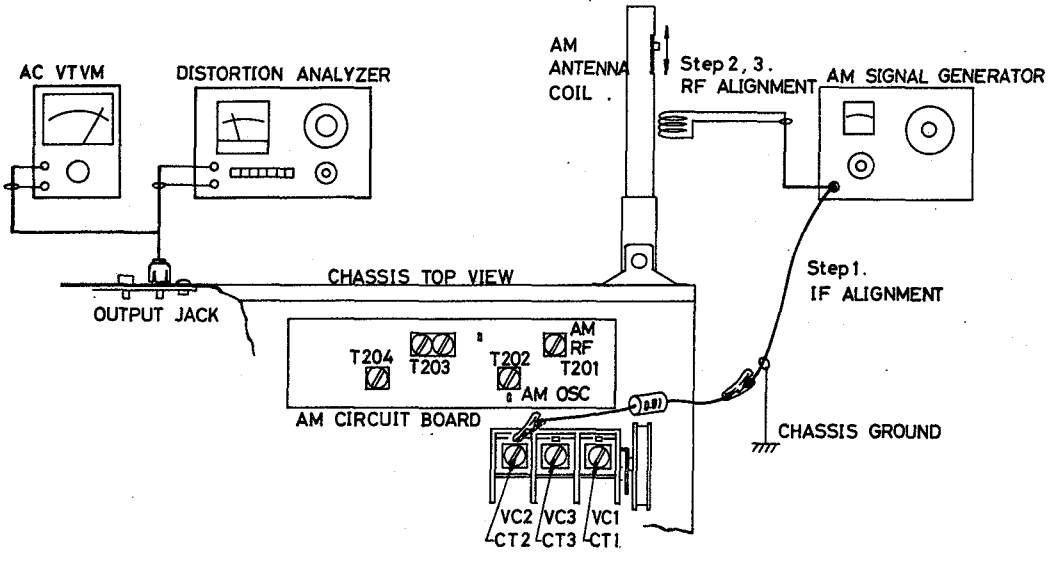


Figure 1. AM Alignment Hook-up

FM ALIGNMENT PROCEDURE

Instruments: FM Signal Generator, Oscilloscope and Distortion Analyzer.

Set Selector switch to FM MONO, Muting switch to OFF and Noise Filter switch to OFF position.

Connect FM Signal Generator to FM antenna terminals.

Connect Oscilloscope and Distortion Analyzer to OUTPUT jack.

Step	Generator		Tuning Dial Setting	Adjust	Adjust for
	Sig. Strength	Frequency			
1	No signal input.		Quiet point on band.	T101 (on FM IF board) Top	Center of FM Tuning Meter (zero point on for Tuning Meter)
2	1 mV	98 MHz (400 Hz 100% Mod.)	Tune for Center of for Tuning Meter	T101 Bottom	Minimum reading on Distortion Analyzer (minimum distortion).
3	1 mV →0			T1 (on Front end) Top and Bottom.	Maximum I.H.F. sensitivity.
4	Repeat steps 2 and 3 until no further improvement is noticed.				
5	Signal strength must be kept -3db of limiter satulation.	90 MHz (400 Hz 100% Mod.)	90 MHz	LO (FM OSC), LR3, LR2, LR1 and LA coil (on Front end)	Maximum output and maximum I.H.F. sensitivity.
6		106 MHz (400 Hz 100% Mod.)	106 MHz	TCO (FM OSC), TCR3, TCR2, TCR1 (FM RF) and TCA (FM ANT) trimmer (on Front end)	
7	Repeat steps 5 and 6 until no further improvement is noticed.				

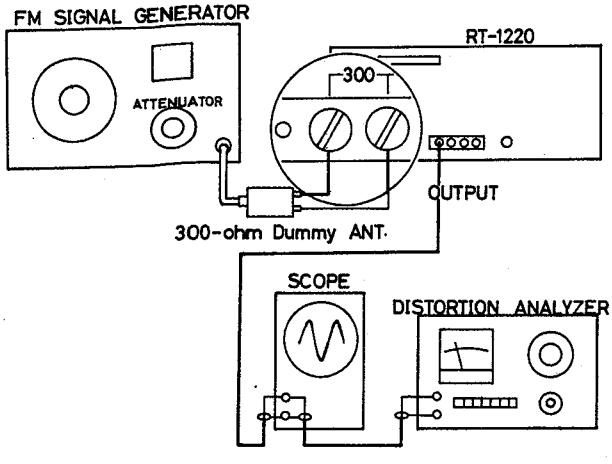


Figure 2. FM Alignment Hook-up

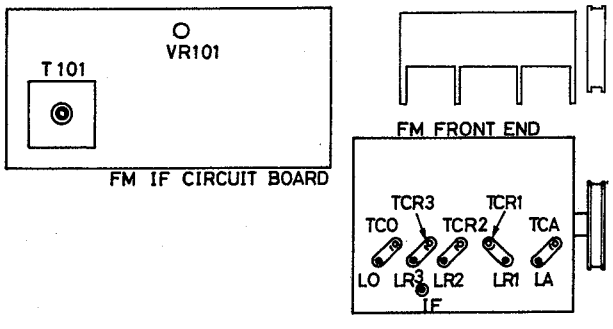


Figure 3. Chassis Top View (FM Section)

FM-STEREO (MPX) ALIGNMENT PROCEDURE

NOTE: The FM IF Alignment must be completed before attempting this FM–MPX Alignment. Poor IF alignment will result in poor FM-SMPX Alignment.

Set Selector switch to FM AUTO, and MPX Filter switch to OFF position.

Connect FM Stereo Generator to FM antenna Terminals.

Set Separation Adj. VR301 (on MPX board) to mid-position before starting this procedure.

Step	Stereo Generator		Output Indicator Connected to	Adjust	Adjust for
	Modulation	RF Deviation			
1	19 KHz Pilot only	1 – 2%	VTVM & Oscilloscope to T.P. (See Fig. 4)	L301, 38KHz 19KHz (yellow and Black)	Maximum reading on VTVM.
2	Composite 1 KHz signal to Left channel only.	Pilot 10% Signal 70%	VTVM & Oscilloscope to Left channel OUTPUT	L301 (Black)	Maximum and undistorted sine wave on scope.
3	Composite 1 KHz signal to Right channel only.			VR301	Minimum reading on VTVM.
4	Same as in Step 2		VTVM & Oscilloscope to Right channel OUTPUT		
5	Repeat steps 3 and 4 until no further improvement is noticed.				

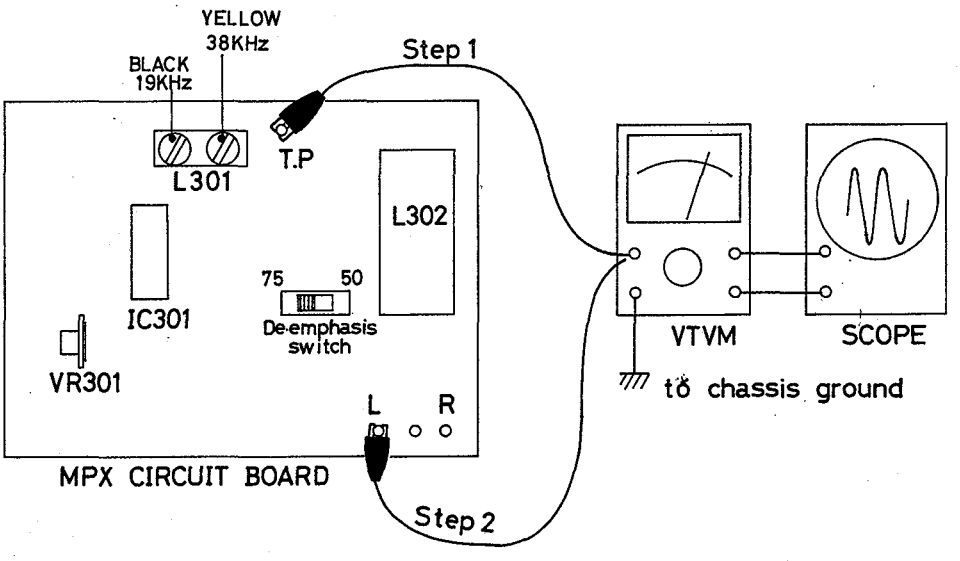


Figure 4. MPX Alignment Hook-up

FM MONO-STEREO AUTOMATIC SWITCHING LEVEL ADJUSTMENT PROCEDURE

1. Connect a VTVM and Oscilloscope to the OUTPUT jack (Left or Right).
2. Feed the FM signal whose MPX has been varied into the FM ANT terminals.
   MPX variation Pilot 10%
   Audio Frequency 1,000Hz (Left or Right chan.) 90%
3. Set the frequency at 98 MHz (when there are disrupting signal, choose another setting).
4. Set the FUNCTION switch to FM Auto.
5. Turn CCW the MONO – STEREO Auto-switching Level Adj. VR101 (on FM IF board): this is a condition in which Auto-switching does not function.
6. Adjust the FM MPX so that the distortion and separation will be best.
7. Adjust the VR101 so that when the antenna input level is 30μV or more, Stereo will switch in and when the input is below the 30μV level, Mono will switch in.
8. After adjustment, check to make sure that, indeed, when the antenna input level exceeds 30μV, Stereo will switch in.

FM MUTING AND FM SIGNAL METER LEVEL ADJUSTMENTS

TEST EUQIPMENTS: FM SIGNAL GENERATOR & OSCILLOSCOPE

1. Connect FM Signal Generator to FM antenna terminals. Set Signal Generator frequency to 90MHz and adjust Signal Generator attenuator to obtain the antenna input level of 1mV (terminal voltage). Then fine tune to 90MHz by turning the tuning knob (Set the minimum distortion to zero on FM tuning meter). Temporarily adjust VR-801 so that oscillation on signal meter stays in the range of 6 to 8. Adjust oscillation on signal meter to the minimum point by turning the muting coil L801. See figure 5.
   When it is difficult to get the minimum point of oscillation on signal meter, adjust it by slightly decreasing the antenna input level (approximately 50 dB).
2. Connect oscilloscope to the tuner output terminal, then set the antenna input level to "10μV" position and adjust VR802 until the waveform on oscilloscope vanishes. See figure 6a.
3. Make sure that the waveform vanishes when the antenna input level is increased to 60dB and signal generator frequency is detuned to ± 100KHz.
   When the waveform vanishing point is extremily unbalanced, fine tune L801 to balance it. It is necessary that the waveform vanishes in the range of ± 20KHz from detuning point of 100KHz. Also after readjusting step2 make sure that the waveform vanishes at the input of 10μV after increasing the antenna input level and slowly decreasing it.
4. Change the muting switch to "30μV" position. Set the antenna input level to 30 V and adjust VR803 until the waveform vanishes at the input of 30μV after increasing the antenna input level and slowly decreasing it.

This adjustment should be done after completing muting adjustment. Set the antenna input level to 1mV (60dB) and adjust VR801 until deflection on signal meter is at the point "8".

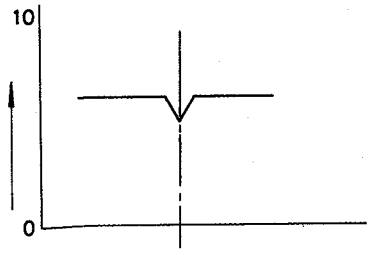


Figure 5. Muting Coil Adjustment

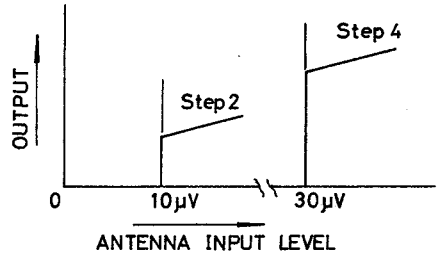
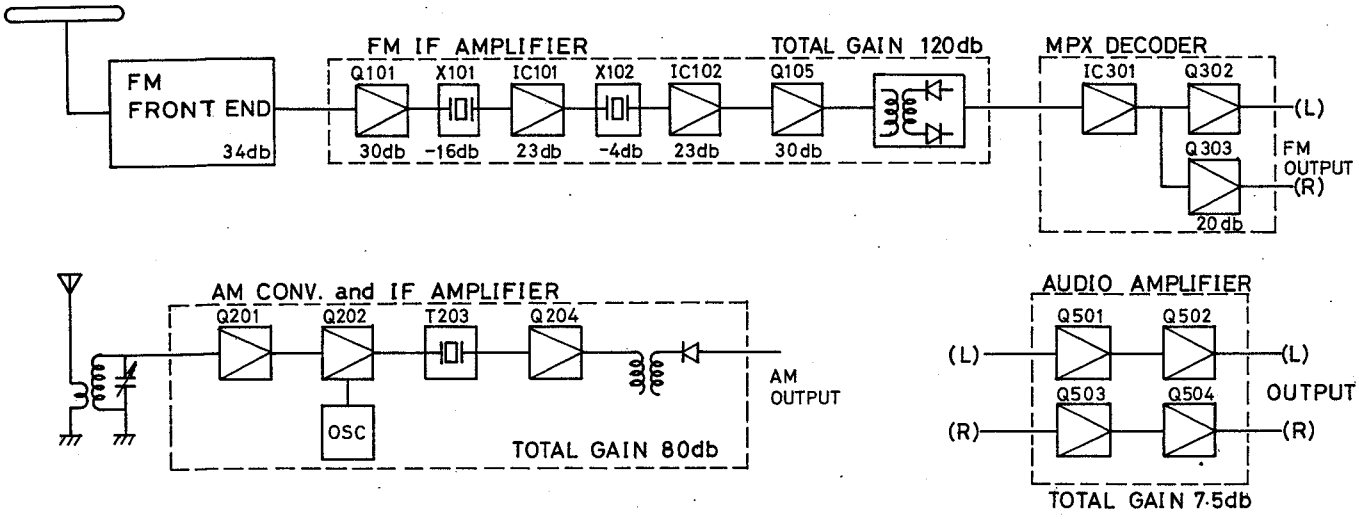


Figure 6. Muting Level Adjustment

GAIN DIAGRAM



TROUBLE SHOOTING

CHART 1.

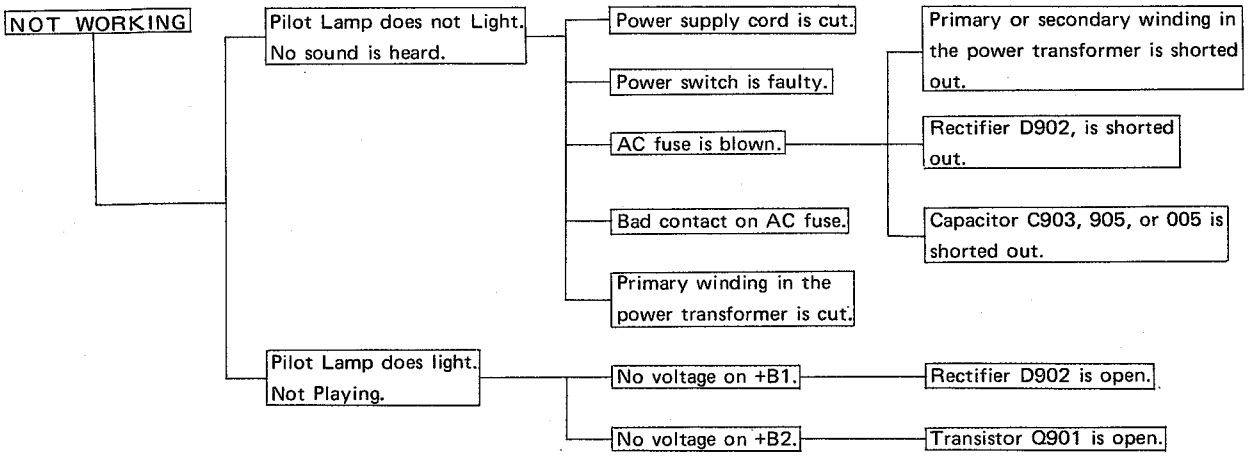

NOT WORKING
Pilot Lamp does not Light.
No sound is heard.
Power supply cord is cut.
Power switch is faulty.
AC fuse is blown.
Bad contact on AC fuse.
Primary winding in the power transformer is cut.
Primary or secondary winding in the power transformer is shorted out.
Rectifier D902, is shorted out.
Capacitor C903, 905, or 005 is shorted out.
Pilot Lamp does light.
Not Playing.
No voltage on +B1.
No voltage on +B2.
Rectifier D902 is open.
Transistor Q901 is open.

CHART 2.

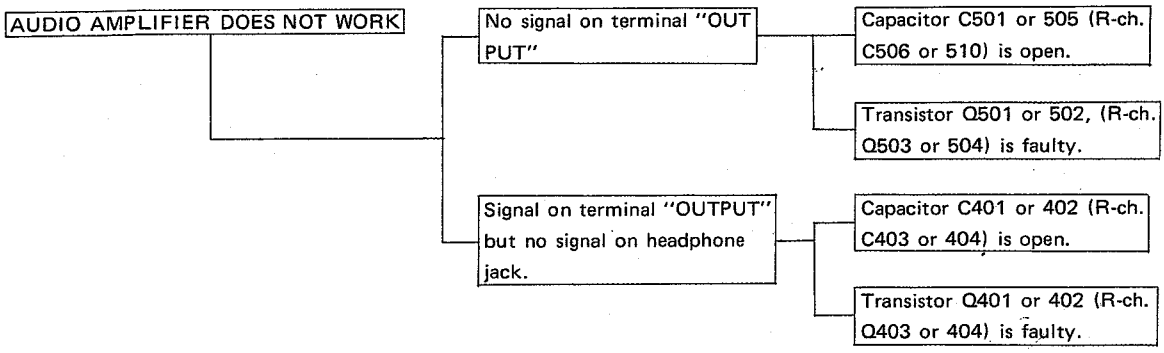

AUDIO AMPLIFIER DOES NOT WORK
No signal on terminal "OUT PUT"
Signal on terminal "OUTPUT" but no signal on headphone jack.
Capacitor C501 or 505 (R-ch. C506 or 510) is open.
Transistor Q501 or 502, (R-ch. Q503 or 504) is faulty.
Capacitor C401 or 402 (R-ch. C403 or 404) is open.
Transistor Q401 or 402 (R-ch. Q403 or 404) is faulty.

CHART 3.

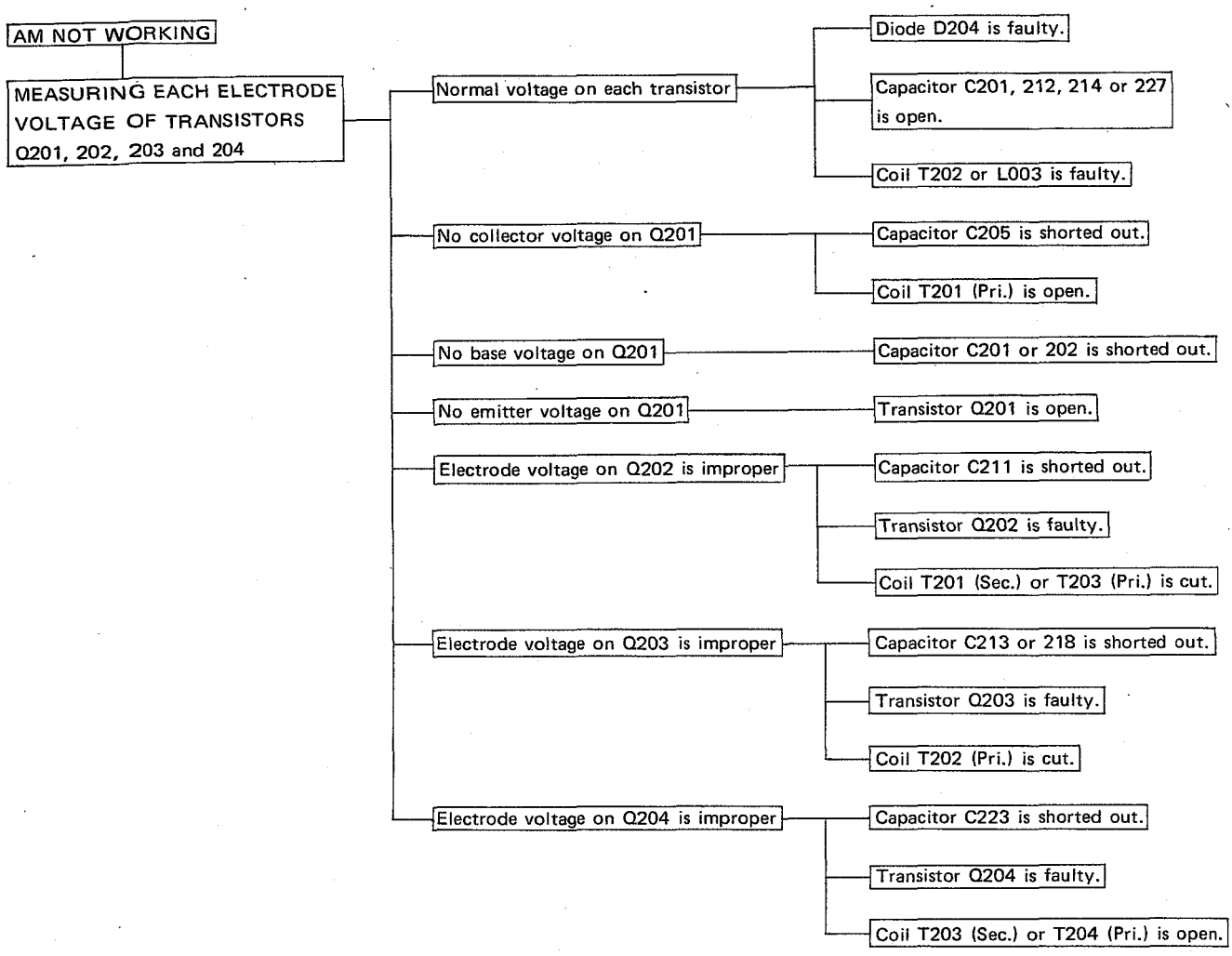

AM NOT WORKING
MEASURING EACH ELECTRODE VOLTAGE OF TRANSISTORS Q201, 202, 203 and 204
Normal voltage on each transistor
Diode D204 is faulty.
Capacitor C201, 212, 214 or 227 is open.
Coil T202 or L003 is faulty.
No collector voltage on Q201
Capacitor C205 is shorted out.
Coil T201 (Pri.) is open.
No base voltage on Q201
Capacitor C201 or 202 is shorted out.
No emitter voltage on Q201
Transistor Q201 is open.
Electrode voltage on Q202 is improper
Capacitor C211 is shorted out.
Transistor Q202 is faulty.
Coil T201 (Sec.) or T203 (Pri.) is cut.
Electrode voltage on Q203 is improper
Capacitor C213 or 218 is shorted out.
Transistor Q203 is faulty.
Coil T202 (Pri.) is cut.
Electrode voltage on Q204 is improper
Capacitor C223 is shorted out.
Transistor Q204 is faulty.
Coil T203 (Sec.) or T204 (Pri.) is open.

CHART 4.

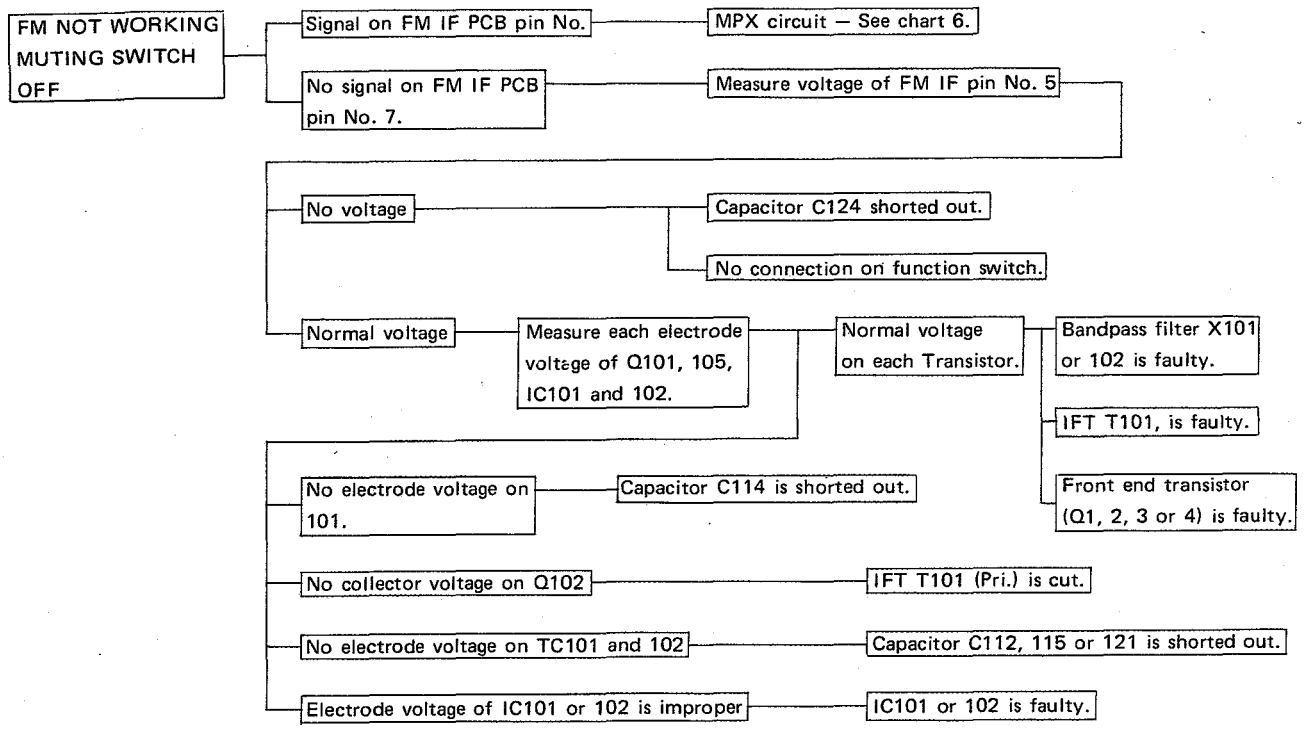

FM NOT WORKING MUTING SWITCH OFF
Signal on FM IF PCB pin No.
MPX circuit — See chart 6.
No signal on FM IF PCB pin No. 7.
Measure voltage of FM IF pin No. 5
No voltage
Capacitor C124 shorted out.
No connection on function switch.
Normal voltage
Measure each electrode voltage of Q101, 105, IC101 and 102.
Normal voltage on each Transistor.
Bandpass filter X101 or 102 is faulty.
IFT T101, is faulty.
Front end transistor (Q1, 2, 3 or 4) is faulty.
No electrode voltage on 101.
Capacitor C114 is shorted out.
No collector voltage on Q102
IFT T101 (Pri.) is cut.
No electrode voltage on TC101 and 102
Capacitor C112, 115 or 121 is shorted out.
Electrode voltage of IC101 or 102 is improper
IC101 or 102 is faulty.

CHART 5.

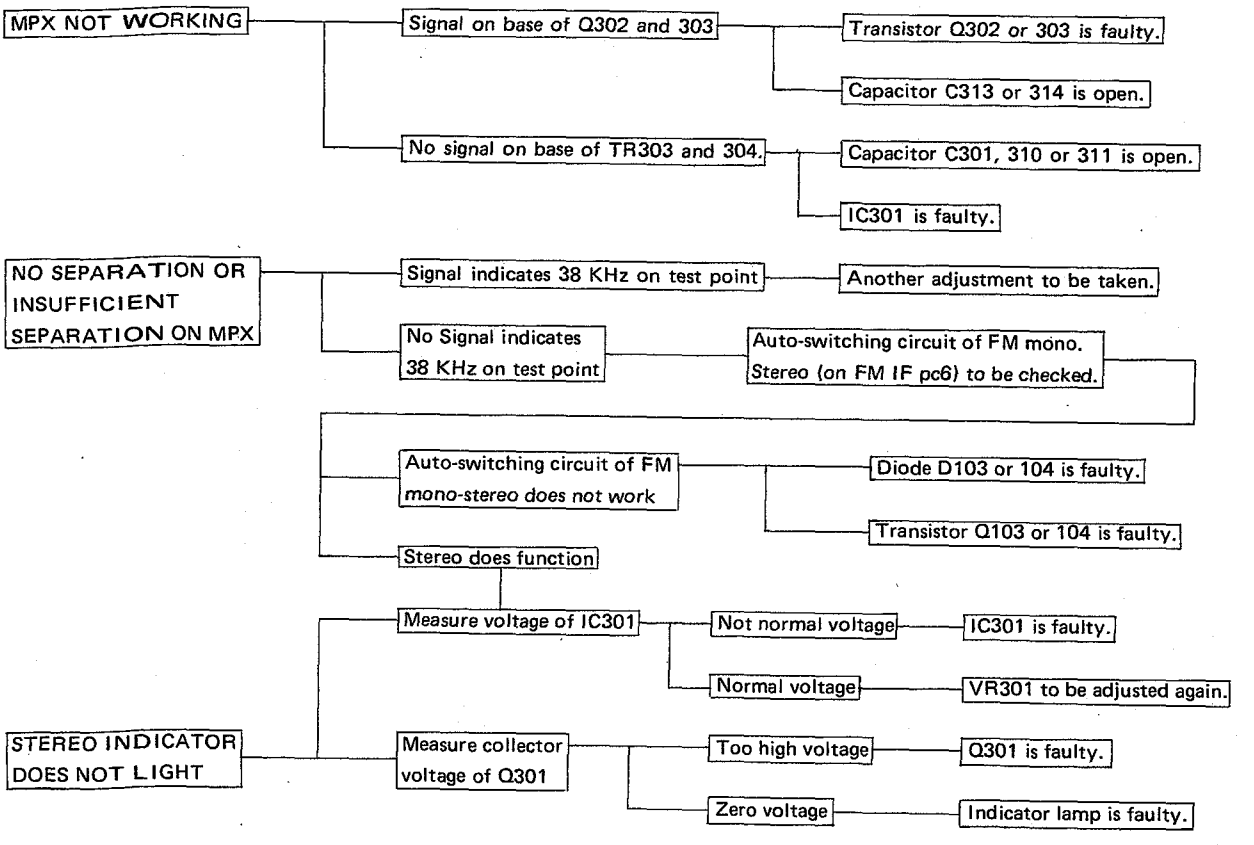
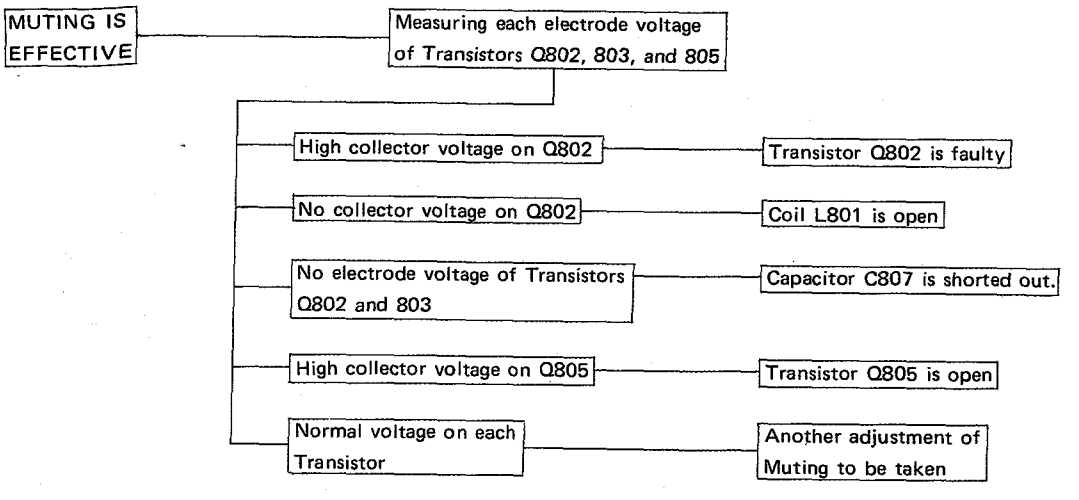

MPX NOT WORKING
Signal on base of Q302 and 303
Transistor Q302 or 303 is faulty.
Capacitor C313 or 314 is open.
No signal on base of TR303 and 304.
Capacitor C301, 310 or 311 is open.
IC301 is faulty.
NO SEPARATION OR INSUFFICIENT SEPARATION ON MPX
Signal indicates 38 KHz on test point
Another adjustment to be taken.
No Signal indicates 38 KHz on test point
Auto-switching circuit of FM mono. Stereo (on FM IF pc6) to be checked.
Auto-switching circuit of FM mono-stereo does not work
Diode D103 or 104 is faulty.
Transistor Q103 or 104 is faulty.
Stereo does function
Measure voltage of IC301
Not normal voltage
IC301 is faulty.
Normal voltage
VR301 to be adjusted again.
STEREO INDICATOR DOES NOT LIGHT
Measure collector voltage of Q301
Too high voltage
Q301 is faulty.
Zero voltage
Indicator lamp is faulty.

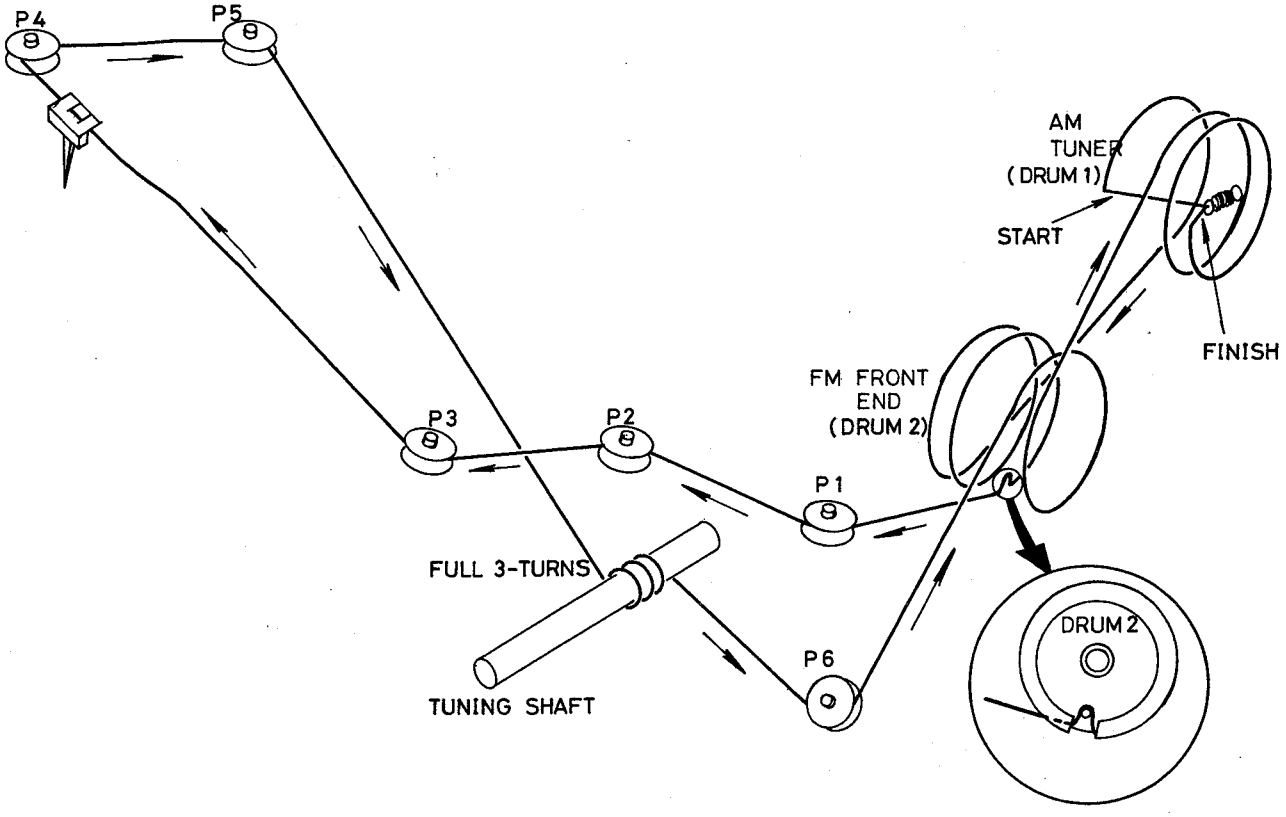
CHART 6.


MUTING IS EFFECTIVE
Measuring each electrode voltage of Transistors Q802, 803, and 805
High collector voltage on Q802
Transistor Q802 is faulty
No collector voltage on Q802
Coil L801 is open
No electrode voltage of Transistors Q802 and 803
Capacitor C807 is shorted out.
High collector voltage on Q805
Transistor Q805 is open
Normal voltage on each Transistor
Another adjustment of Muting to be taken

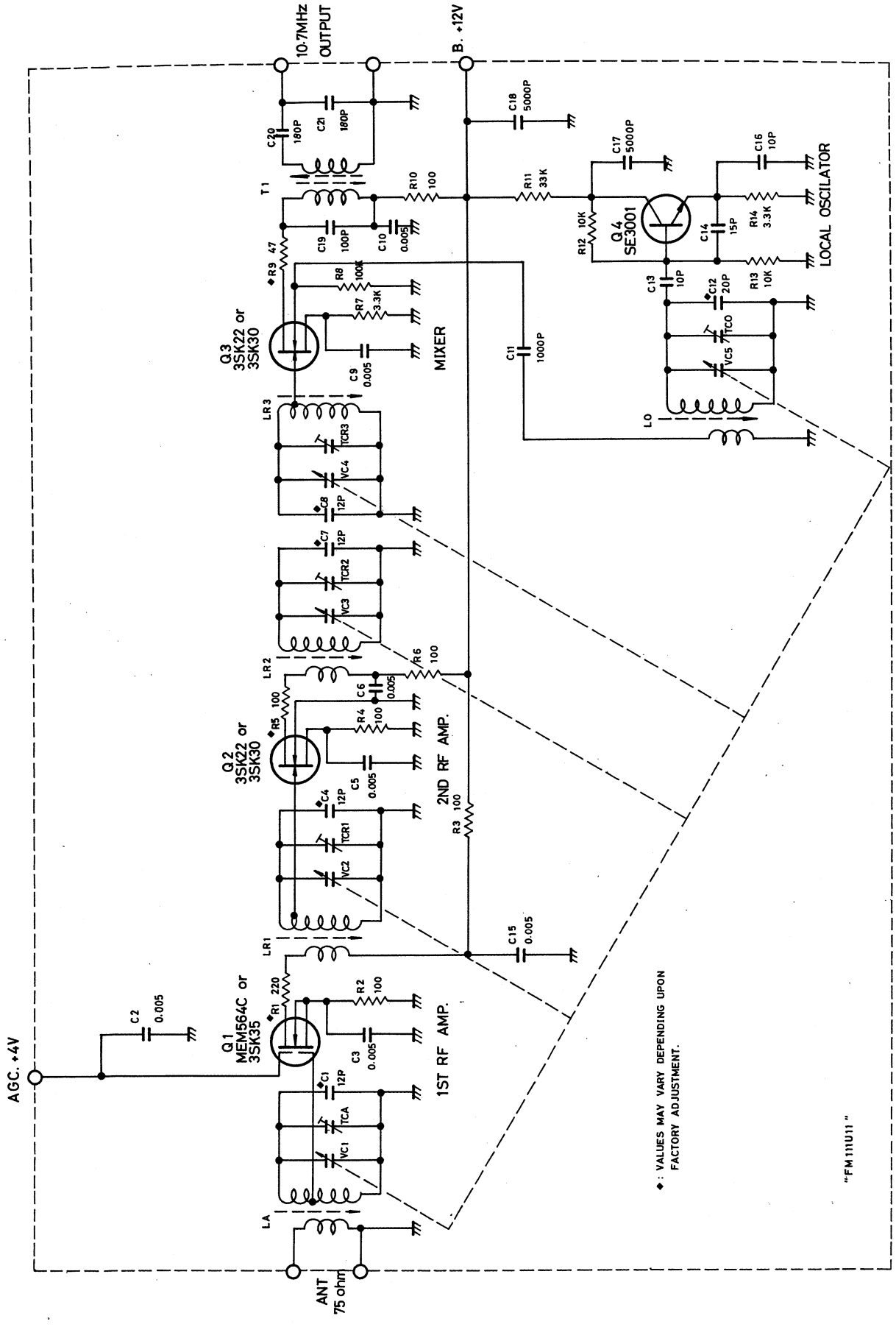
DIAL STRING DIAGRAM

DIAL STRINGING PROCEDURES

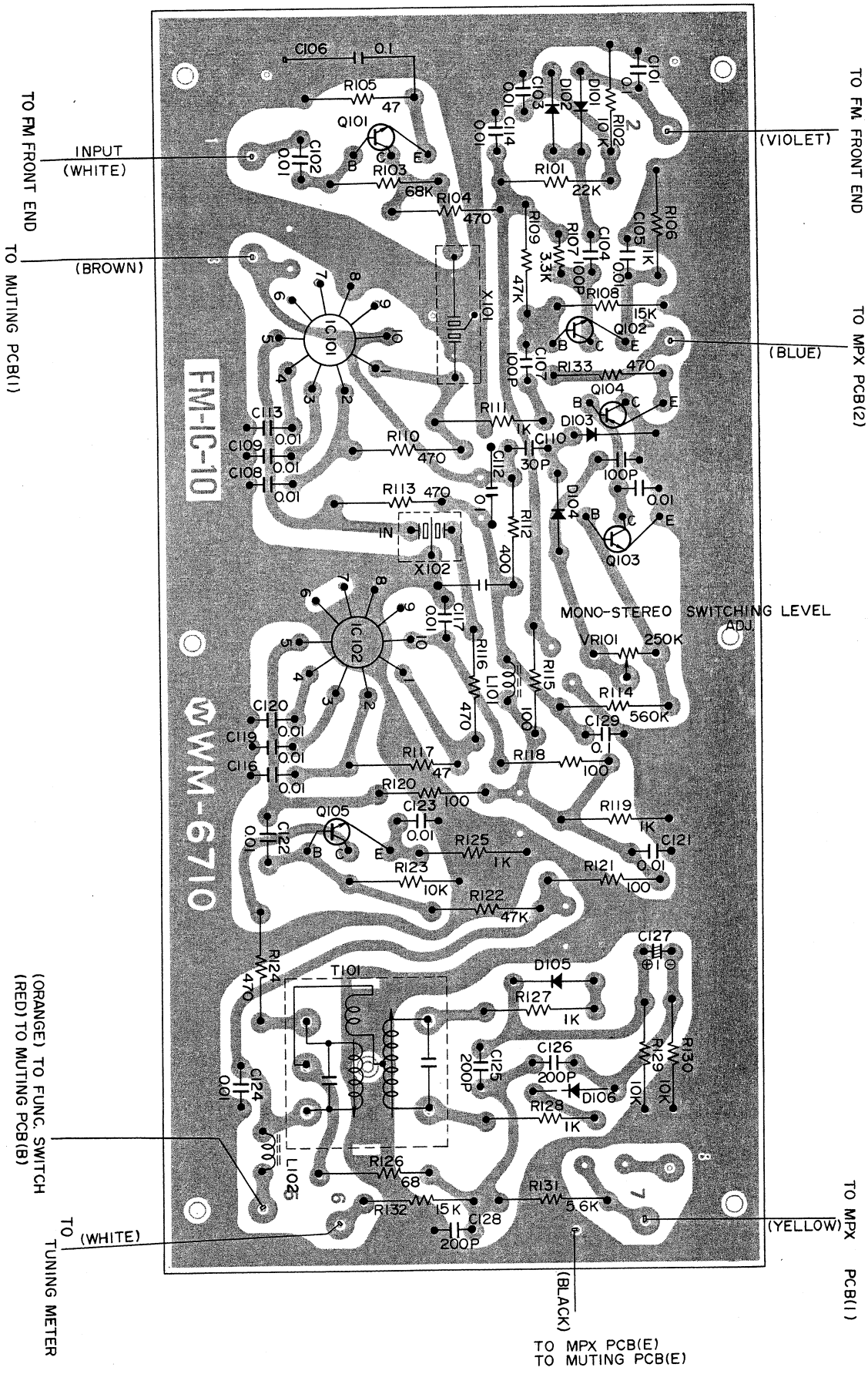
1. In order to place both AM and FM variable capacitors (Front End) at common positions, turn DRUM 1 and DRUM 2 fully clockwise until stop.
2. Begin the stringing by winding a string once around DRUM 1 clockwise and to DRUM 2, at which make 2 windings before going onto the idler pulley P1. Be sure to hook the string on the protrusion inside DRUM 2 as illustrated.
3. After winding through the idler pulleys P1, P2, P3, P4 and P5 as shown, the string should be wound 3 full turns around Tuning Shaft.
4. After winding through P6, string should be wound 1 full turn around DRUM 2 and then 2 full turns around DRUM 1. Finally, fix the string onto the spring at the same place as where the starting end is attached.



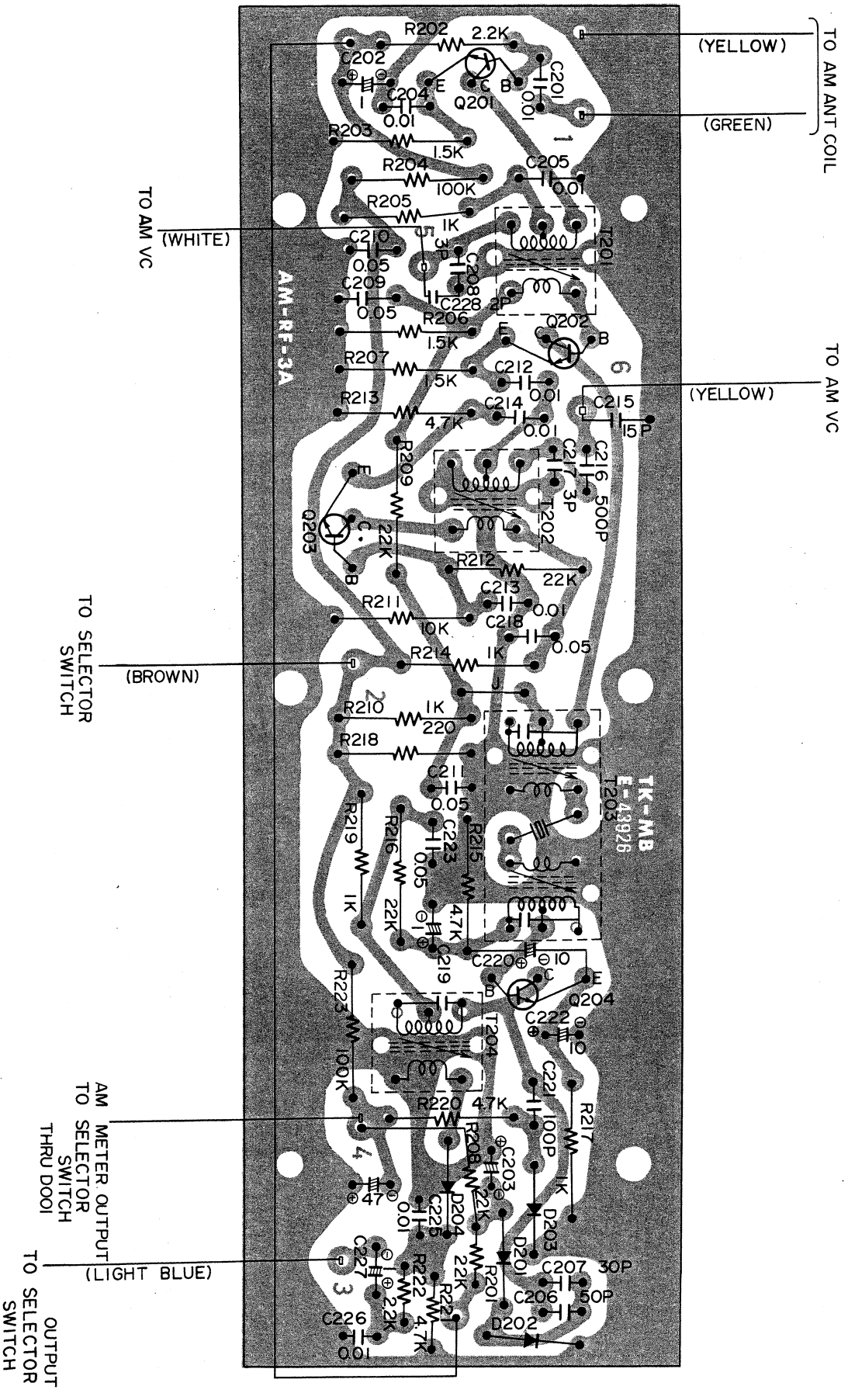
FM FRONT END SCHEMATIC DIAGRAM



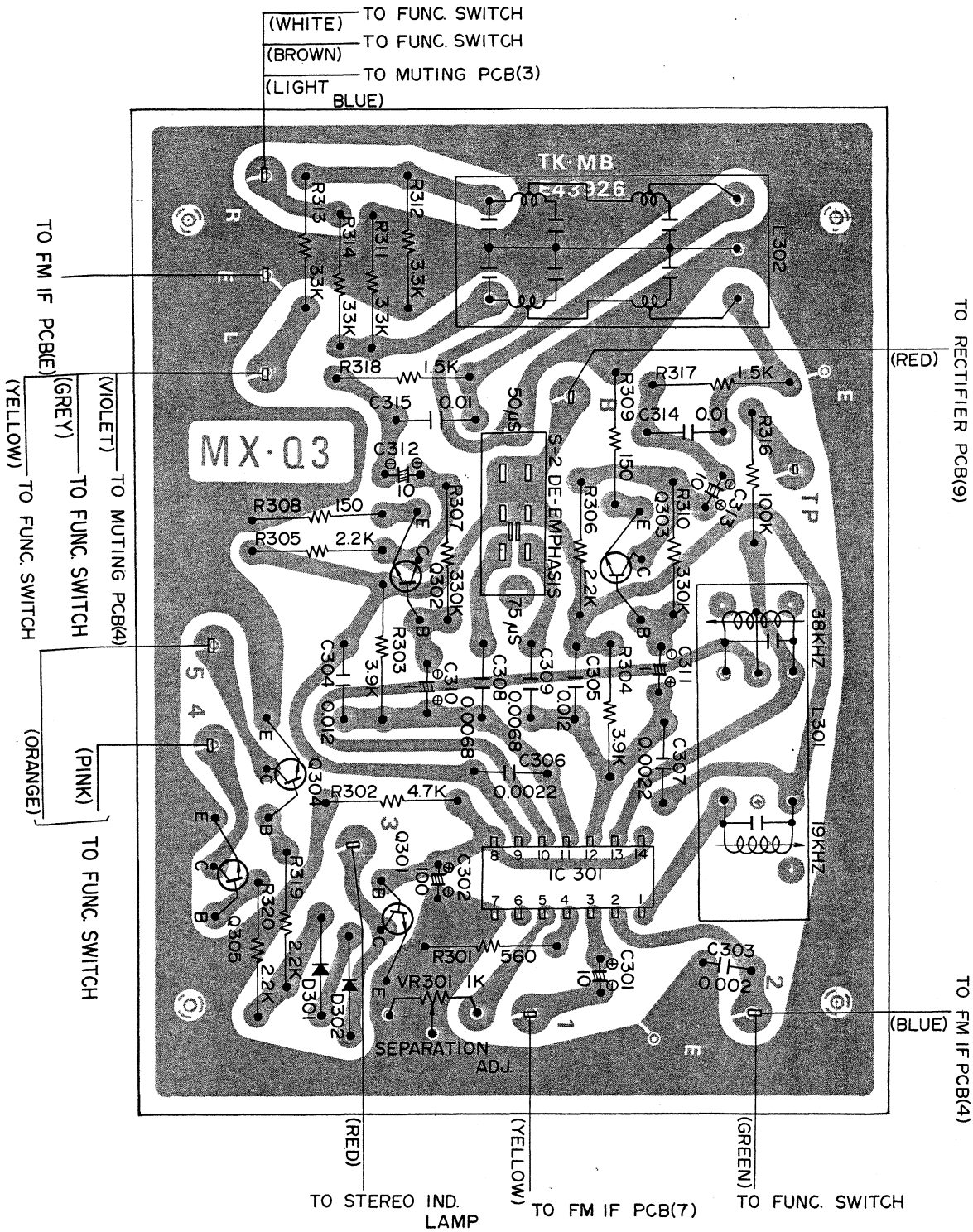
FM IF AMPLIFIER CIRCUIT BOARD DIAGRAM



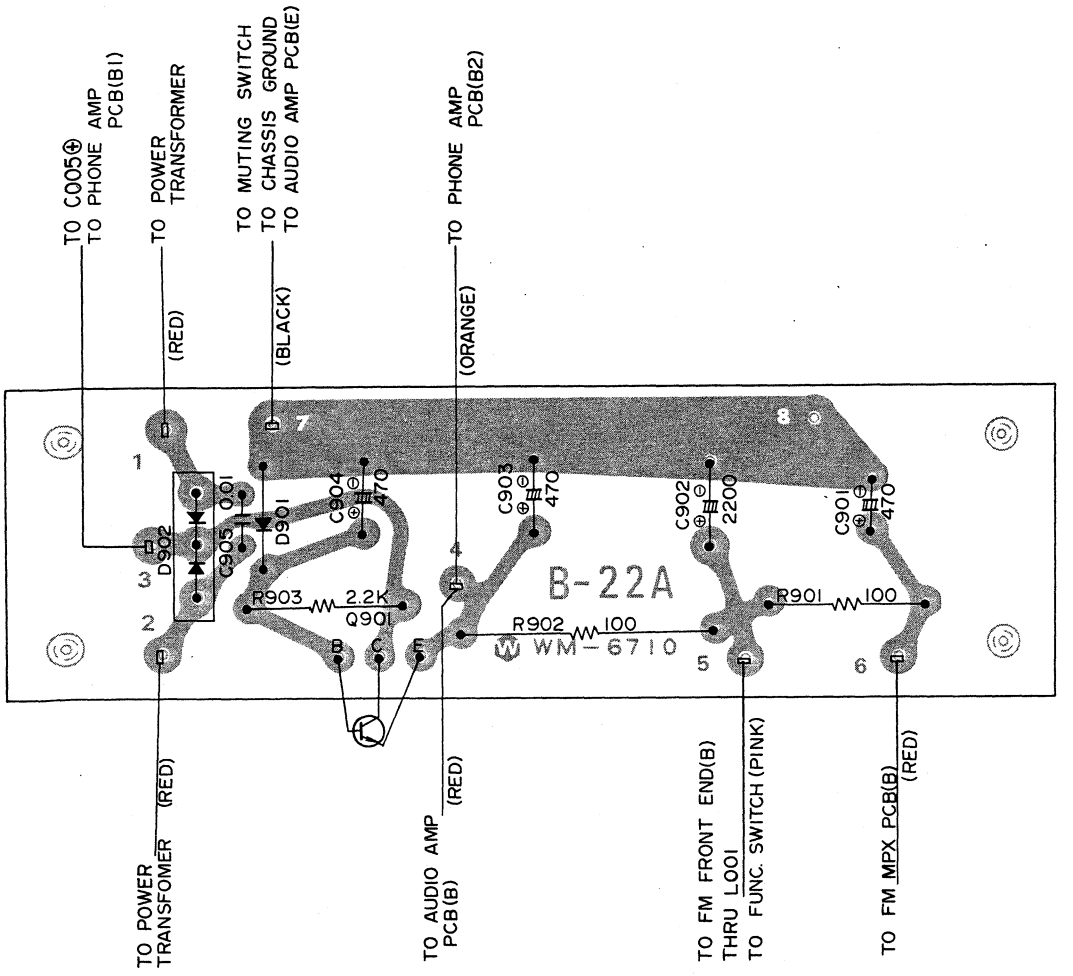
AM CIRCUIT BOARD DIAGRAM



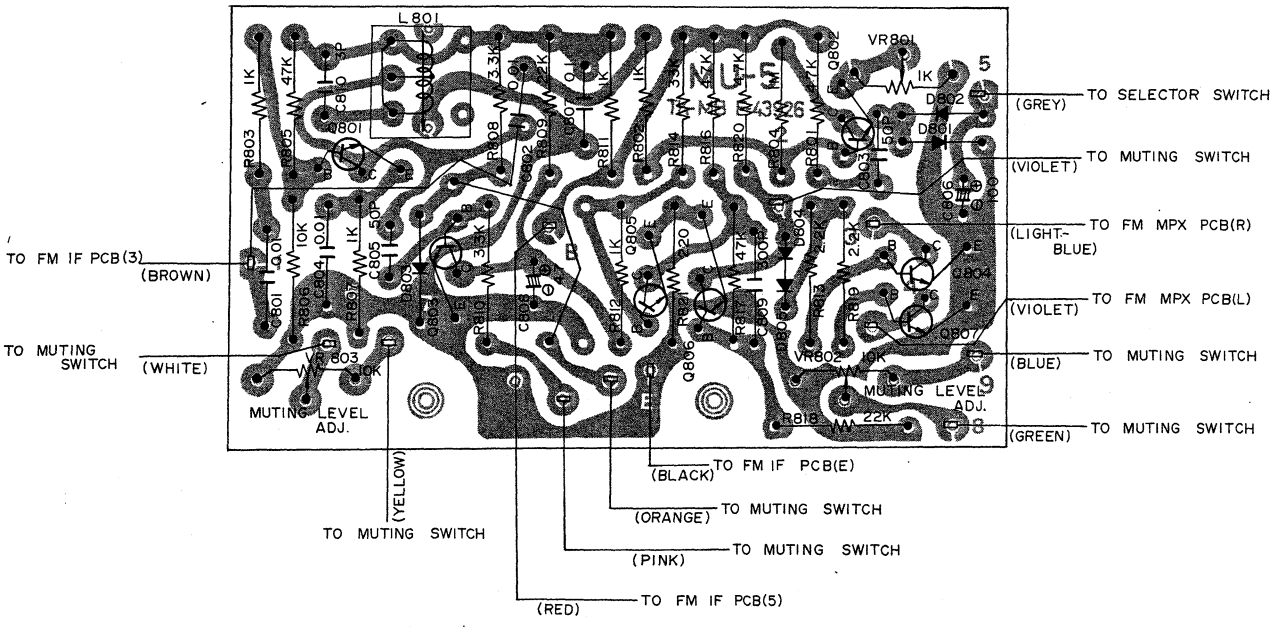
FM-STEREO (MPX) CIRCUIT BOARD DIAGRAM



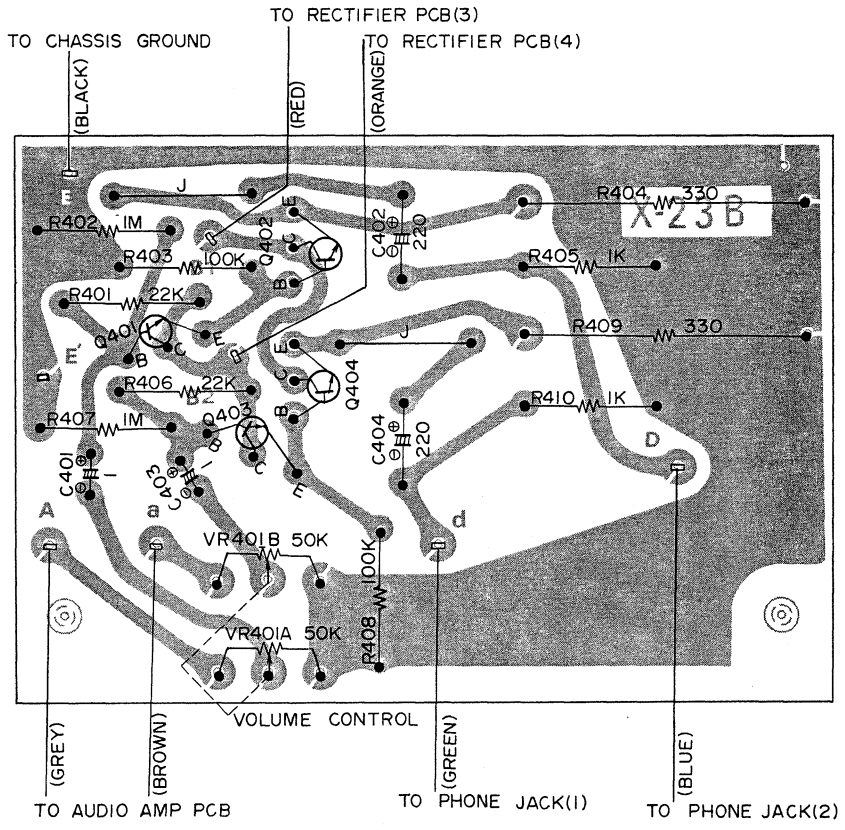
RECTIFIER CIRCUIT BOARD DIAGRAM



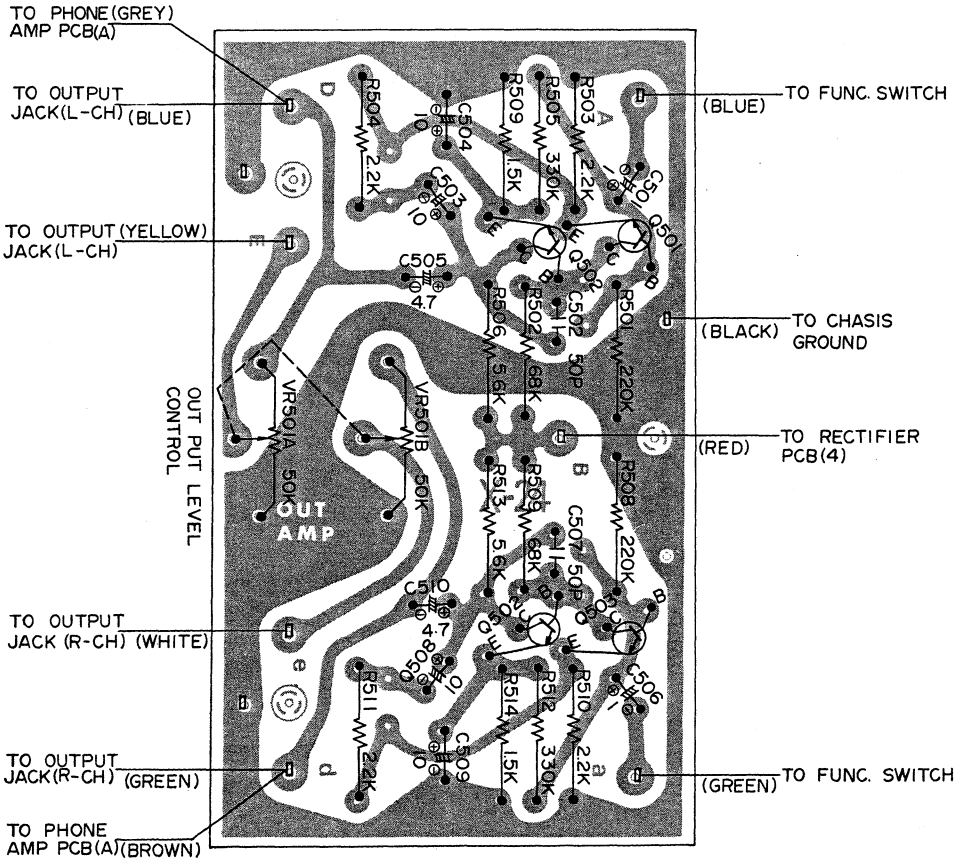
MUTING CIRCUIT BOARD DIAGRAM

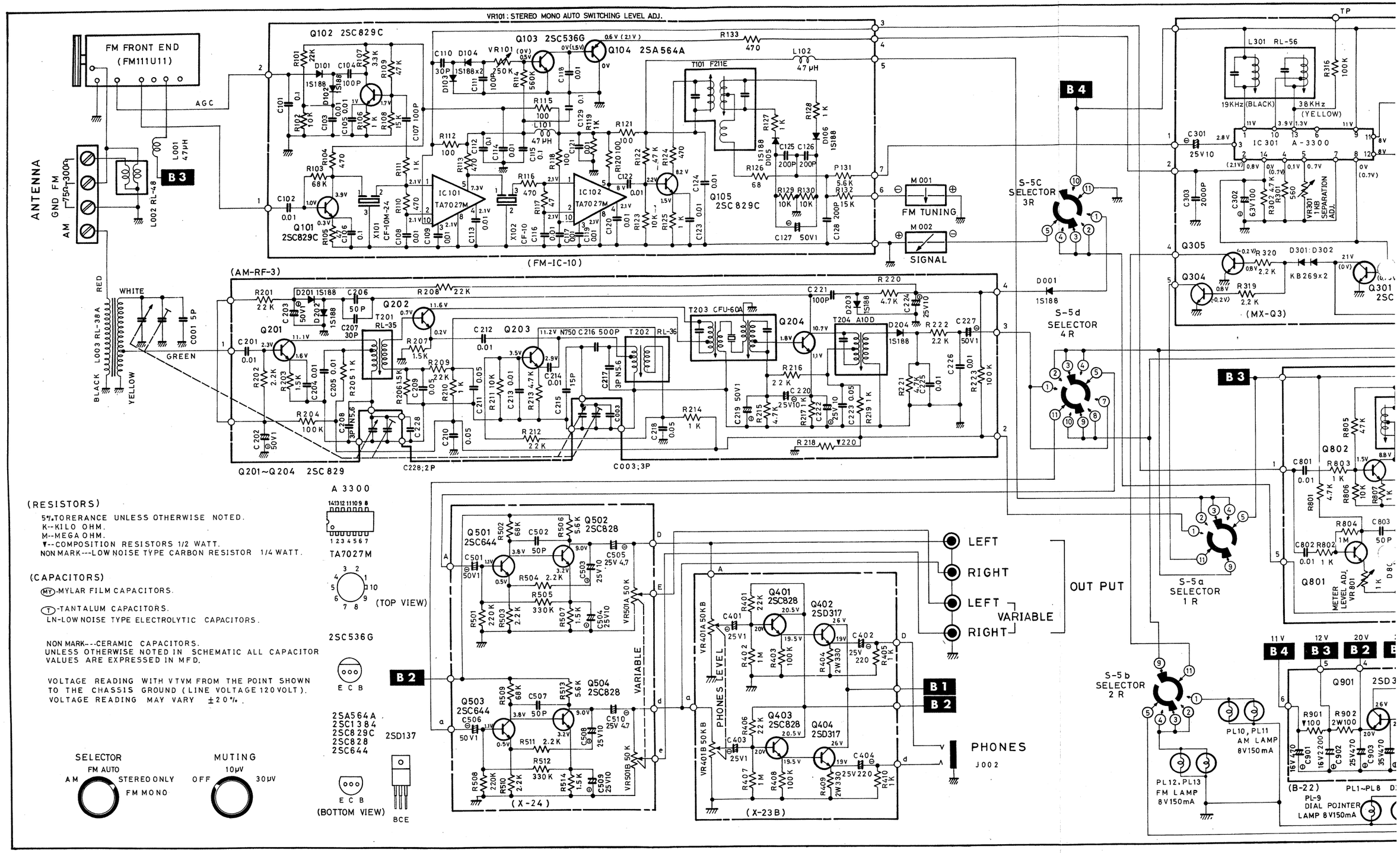


PHONO AMPLIFIER CIRCUIT BOARD DIAGRAM



AUDIO AMPLIFIER CIRCUIT BOARD DIAGRAM




VR101 : STEREO MONO AUTO SWITCHING LEVEL ADJ.
FM FRONT END (FM111U11)
AGC
ANTENNA
GND FM
AM
75Ω 300Ω
L001 47μH
L002 RL-48
B3
Q102 2SC829C
Q103 2SC536G
Q104 2SA564A
Q101 2SC829C
IC101 TA7027M
IC102 TA7027M
X101 CF-10M-24
X102 CF-10
Q105 2SC829C
T101 F211E
L102 47μH
L101 47μH
(FM-IC-10)
(AM-RF-3)
WHITE
RED
GREEN
BLACK L003 RL-38A
YELLOW
C001 5P
Q201
Q202
Q203
Q204
T201 RL-35
T202 RL-36
T203 CFU-60A
T204 A10D
Q201~Q204 2SC829
C228;2P
C003;3P
A 3300
TA7027M
(TOP VIEW)
2SC536G
E C B
2SA564A
2SC1384
2SC829C
2SC828
2SC644
2SD137
(BOTTOM VIEW)
BCE
(RESISTORS)
5%TORERANCE UNLESS OTHERWISE NOTED.
K--KILO OHM.
M--MEGA OHM.
▼--COMPOSITION RESISTORS 1/2 WATT.
NON MARK---LOW NOISE TYPE CARBON RESISTOR 1/4 WATT.
(CAPACITORS)
(MY)-MYLAR FILM CAPACITORS.
(T)-TANTALUM CAPACITORS.
LN-LOW NOISE TYPE ELECTROLYTIC CAPACITORS.
NON MARK---CERAMIC CAPACITORS.
UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES ARE EXPRESSED IN MFD.
VOLTAGE READING WITH VTVM FROM THE POINT SHOWN TO THE CHASSIS GROUND (LINE VOLTAGE 120 VOLT).
VOLTAGE READING MAY VARY ±20%.
SELECTOR
FM AUTO
AM
STEREO ONLY
FM MONO
MUTING
OFF
10μV
30μV
Q501 2SC644
Q502 2SC828
Q503 2SC644
Q504 2SC828
(X-24)
VARIABLE
PHONES LEVEL
Q401 2SC828
Q402 2SD317
Q403 2SC828
Q404 2SD317
(X-23B)
LEFT
RIGHT
LEFT
RIGHT
VARIABLE
OUT PUT
PHONES
J002
B1
B2
B4
M001
FM TUNING
M002
SIGNAL
S-5C SELECTOR 3R
D001 1S188
S-5d SELECTOR 4R
S-5a SELECTOR 1R
S-5b SELECTOR 2R
TP
L301 RL-56
19KHz (BLACK)
38KHz (YELLOW)
IC 301 A-3300
VR301 (SEPARATION ADJ.)
Q305
Q304
D301 D302
KB269x2
(MX-Q3)
Q801
METER LEVEL ADJ. VR801
Q802
Q901
PL10, PL11 AM LAMP 8V150mA
PL12, PL13 FM LAMP 8V150mA
PL-9 DIAL POINTER LAMP 8V150mA
(B-22)

FM-IC-10	C	129
	R	132
AM-RF-3	C	228
	R	223
MX-Q3	C	315
	R	320
X-23B	C	404
	R	410
X-24	C	510
	R	514
MU-5	C	810
	R	820
B-22	C	905
	R	903

	MUTING OFF			MUTING SWITCH ON WITH SIGNAL			MUTING SWITCH ON WITH NO SIGNAL		
	C	B	E	C	B	E	C	B	E
Q801	7.5V	0.9V	0.3V	—	—	—	—	—	—
Q802	8.8V	1.5V	0.85V	—	—	—	—	—	—
Q803	1.1V	0.4V	—	0.8V	—	—	—	—	—
Q804	0V	—	—	-0.2V	—	—	0.75V	—	—
Q805	11.2V	0.45V	0V	11.2V	0.5V	0.6V	0.7V	1.35V	0.65V
Q806	0V	0.7V	—	0.6V	1.3V	—	5V	0.2V	—
Q807	0V	—	—	-0.2V	—	—	0.75V	—	—

PARTS LIST

FM IF AMPLIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R101	552022322	Carbon Film, 22K ±5%, 1/4W
R102, 123, R129, 130	552010322	Carbon Film, 10K ±5%, 1/4W
R103	552068322	Carbon Film, 68K ±5%, 1/4W
R104, 110, R113, 116, R124, 133	552047122	Carbon Film, 470 ±5%, 1/4W
R105, 117	552047022	Carbon Film, 47 ±5%, 1/4W
R106, 111, R119, 125, R127, 128	552010222	Carbon Film, 1K ±5%, 1/4W
R107	552033222	Carbon Film, 3.3K ±5%, 1/4W
R108, 132	552015322	Carbon Film, 15K ±5%, 1/4W
R109, 122	552047322	Carbon Film, 47K ±5%, 1/4W
R112, 115, R118, 120, R121	552010122	Carbon Film, 100 ±5%, 1/4W
R114	552056422	Carbon Film, 560K ±5%, 1/4W
R126	552068022	Carbon Film, 68 ±5%, 1/4W
R131	552056222	Carbon Film, 5.6K ±5%, 1/4W
VR101	510502127	Potentiometer, 250K
	CAPACITORS	
C101, 106, C112, 115, C129	440100835	Ceramic, 0.1mfd, 50V
C102, 103, C105, 108, C109, 113, C114, 116, C117, 118, C119, 120, C121, 122, C123, 124	440100985	Ceramic, 0.01mfd, 250V

Schematic Location	Part No.	Description
C104, 107, C111	440101183	Ceramic, 100pF ±10%, 250V
C110	440301283	Ceramic, 30pF ±10%, 250V
C125, 126, C128	440201183	Ceramic, 200pF ±10%, 250V
C127	402100749	Electrolytic, 1mfd, 50V
	TRANSISTORS	
Q101, 102, Q105	301201117	2SC829C
Q103	301201112	2SC536G
Q104	301001117	2SA564A
IC101, 102,	303452141	TA7027M
	DIODES	
D101, 102, D103, 104, D105, 106	300111008	1S188
L101, 102	220001121	Coil, RF choke, 47μH
T101	225501113	IFT, FM Ratio Det.
X101	229101127	Bandpass Filter, 10.70MHz (Red)
X102	229101125	Bandpass Filter, 10.70MHz (Red)
	770101223	Pin, Terminal
	140200122	Printed Circuit Board, "FM-IC-8"
	141210141	FM IF Amp. Circuit Assembly

AM CONV. AND IF AMPLIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R201, 208, R209, 212, R216	552022322	Carbon Film, 22K ±5%, 1/4W
R202, 222	552022222	Carbon Film, 2.2K ±5%, 1/4W
R203, 206, R207	552015222	Carbon Film, 1.5K ±5%, 1/4W

Schematic Location	Part No.	Description
R204, 223	552010422	Carbon Film, 100K ±5%, 1/4W
R205, 210, R214, 217, R219	552010222	Carbon Film, 1K ±5%, 1/4W
R211	552010322	Carbon Film, 10K ±5%, 1/4W
R213, 215, R220, 221	552047222	Carbon Film, 4.7K ±5%, 1/4W
R218	551022133	Composition, 220 ±10%, 1/2W

Schematic Location	Part No.	Description
	CAPACITORS	
C201, 204, C205, 212, C213, 214, C225, 226	440100985	Ceramic, 0.01mfd, 250V
C202, 203, C219, 227	402100749	Electrolytic, 1mfd, 50V
C206	440501283	Ceramic, 50pF ±10%, 250V
C207	440301283	Ceramic, 30pF ±10%, 250V
C208, 217	441301336	Ceramic, 3pF (N5.6), 50V
C209, 210, C211, 218, C223	440500935	Ceramic, 0.05mfd, 50V
C215	440101283	Ceramic, 15pF ±10%, 250V
C216	440501183	Ceramic, 500pF ±10%, 250V
C220, 222, C224	402100629	Electrolytic, 10mfd, 25V
C221	440101183	Ceramic, 100pV ±10%, 250V

Schematic Location	Part No.	Description
C228	440201388	Ceramic, 2pF ±0.5pF, 250V
	TRANSISTORS	
Q201, 202, Q203, 204	301201117	2SC829C
	DIODES	
D201, 202, D203, 204	300111008	1S188
T201	226501112	Coil, AM RF
T202	223301123	Coil, AM Local Oscillator
T203	229101129	Bandpass Filter, 455KHz
T204	225301124	IFT, AM Det.
	770101223	Pin, Terminal
	140100123	Printed Circuit Board, "AM-RF-3"
	141110132	AM Conv. and IF Amp. Circuit Assembly

FM MPX CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R301	552056122	Carbon Film, 560 ±5%, 1/4W
R302	552047222	Carbon Film, 4.7K ±5%, 1/4W
R303, 304	552039222	Carbon Film, 3.9K ±5%, 1/4W
R305, 306 R319, 320	552022222	Carbon Film, 2.2K ±5%, 1/4W
R307, 310	552033422	Carbon Film, 330K ±5%, 1/4W
R308, 309	552015122	Carbon Film, 150 ±5%, 1/4W
R311, 312	552033222	Carbon Film, 3.3K ±5%, 1/4W
R313, 314	552033322	Carbon Film, 33K ±5%, 1/4W
R316	552010422	Carbon Film, 100K ±5%, 1/4W
R317, 318	552015222	Carbon Film, 1.5K ±5%, 1/4W
VR301	510502119	Potentiometer, 1K
	CAPACITORS	
C301, 312, C313	402100629	Electrolytic, 10mfd, 25V
C302	402100509	Electrolytic, 100mfd, 6.3V
C303	450201033	Mylar Film, 0.002mfd ±10%, 50V

Schematic Location	Part No.	Description
C304, 305	452120932	Mylar Film, 0.012mfd ±5%, 50V
C306, 307	452221032	Mylar Film, 0.0022mfd ±5%, 50V
C308, 309	452681032	Mylar Film, 0.0068mfd ±5%, 50V
C310, 311	402100749	Electrolytic, 1mfd, 50V
C314, 315	452100932	Mylar Film, 0.01mfd ±5%, 50V
	TRANSISTORS	
Q301	301201132	2SC1384
Q302, 303, Q304, 305	301201115	2SC828
IC301	303452145	A-3300
D301, 302	300212004	Diode, KB-269
L301	225601129	Coil, MPX, 19KHz/38KHz Tune
L302	228641113	Coil, 38KHz Filter
S2	613000024	Switch, De-emphasis Selector
	770101223	Pin, Terminal
	140400445	Printed Circuit Board, "MX-Q3"
	141411431	FM MPX Circuit Assembly

Schematic Location	Part No.	Description
	CAPACITORS	
C201, 204, C205, 212, C213, 214, C225, 226	440100985	Ceramic, 0.01mfd, 250V
C202, 203, C219, 227	402100749	Electrolytic, 1mfd, 50V
C206	440501283	Ceramic, 50pF ±10%, 250V
C207	440301283	Ceramic, 30pF ±10%, 250V
C208, 217	441301336	Ceramic, 3pF (N5.6), 50V
C209, 210, C211, 218, C223	440500935	Ceramic, 0.05mfd, 50V
C215	440101283	Ceramic, 15pF ±10%, 250V
C216	440501183	Ceramic, 500pF ±10%, 250V
C220, 222, C224	402100629	Electrolytic, 10mfd, 25V
C221	440101183	Ceramic, 100pV ±10%, 250V

Schematic Location	Part No.	Description
C228	440201388	Ceramic, 2pF ±0.5pF, 250V
	TRANSISTORS	
Q201, 202, Q203, 204	301201117	2SC829C
	DIODES	
D201, 202, D203, 204	300111008	1S188
T201	226501112	Coil, AM RF
T202	223301123	Coil, AM Local Oscillator
T203	229101129	Bandpass Filter, 455KHz
T204	225301124	IFT, AM Det.
	770101223	Pin, Terminal
	140100123	Printed Circuit Board, "AM-RF-3"
	141110132	AM Conv. and IF Amp. Circuit Assembly

FM MPX CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R301	552056122	Carbon Film, 560 ±5%, 1/4W
R302	552047222	Carbon Film, 4.7K ±5%, 1/4W
R303, 304	552039222	Carbon Film, 3.9K ±5%, 1/4W
R305, 306 R319, 320	552022222	Carbon Film, 2.2K ±5%, 1/4W
R307, 310	552033422	Carbon Film, 330K ±5%, 1/4W
R308, 309	552015122	Carbon Film, 150 ±5%, 1/4W
R311, 312	552033222	Carbon Film, 3.3K ±5%, 1/4W
R313, 314	552033322	Carbon Film, 33K ±5%, 1/4W
R316	552010422	Carbon Film, 100K ±5%, 1/4W
R317, 318	552015222	Carbon Film, 1.5K ±5%, 1/4W
VR301	510502119	Potentiometer, 1K
	CAPACITORS	
C301, 312, C313	402100629	Electrolytic, 10mfd, 25V
C302	402100509	Electrolytic, 100mfd, 6.3V
C303	450201033	Mylar Film, 0.002mfd ±10%, 50V

Schematic Location	Part No.	Description
C304, 305	452120932	Mylar Film, 0.012mfd ±5%, 50V
C306, 307	452221032	Mylar Film, 0.0022mfd ±5%, 50V
C308, 309	452681032	Mylar Film, 0.0068mfd ±5%, 50V
C310, 311	402100749	Electrolytic, 1mfd, 50V
C314, 315	452100932	Mylar Film, 0.01mfd ±5%, 50V
	TRANSISTORS	
Q301	301201132	2SC1384
Q302, 303, Q304, 305	301201115	2SC828
IC301	303452145	A-3300
D301, 302	300212004	Diode, KB-269
L301	225601129	Coil, MPX, 19KHz/38KHz Tune
L302	228641113	Coil, 38KHz Filter
S2	613000024	Switch, De-emphasis Selector
	770101223	Pin, Terminal
	140400445	Printed Circuit Board, "MX-Q3"
	141411431	FM MPX Circuit Assembly

AUDIO AMPLIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R501, 508	552022422	Carbon Film, 220K ±5%, 1/4W
R502, 509	552068322	Carbon Film, 68K ±5%, 1/4W
R503, 504, R510, 511	552022222	Carbon Film, 2.2K ±5%, 1/4W
R505, 512	552033422	Carbon Film, 330K ±5%, 1/4W
R506, 513	552056222	Carbon Film, 5.6K ±5%, 1/4W
R507, 514	552015222	Carbon Film, 1.5K ±5%, 1/4W
VR501	525101111	Variable, 50K x 2, Output Level Control
	CAPACITORS	
C501, 506	402100749	Electrolytic, 1mfd, 50V

Schematic Location	Part No.	Description
C502, 507	440501283	Ceramic, 50pF ±10%, 250V
C503, 504, C508, 509	402100629	Electrolytic, 10mfd, 25V
C505, 510	402470729	Electrolytic, 4.7mfd, 25V
	TRANSISTORS	
Q501, 503	301201114	2SC644
Q502, 504	301201115	2SC828
	770101223	Pin, Terminal
	140800154	Printed Circuit Board, "X-24"
	141810560	Audio Amplifier Circuit Assembly

HEADPHONE AMPLIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R401, 406	552022322	Carbon Film, 22K ±5%, 1/4W
R402, 407	552010522	Carbon Film, 1M ±5%, 1/4W
R403, 408	552010422	Carbon Film, 100K ±5%, 1/4W
R404, 409	553133153	Metal Oxide, 330 ±10%, 2W
R405, 410	552010222	Carbon Film, 1K ±5%, 1/4W
VR401	525101117	Variable, 50KB x2
	CAPACITORS	
C401, 403	402100749	Electrolytic, 1mfd, 50V

Schematic Location	Part No.	Description
C402, 404	402220529	Electrolytic, 220mfd, 25V
	TRANSISTORS	
Q401, 403	301201115	2SC828
Q402, 404	301301122	2SD317
	770101223	Pin, Terminal
	140800153	Printed Circuit Board, "X-23"
	141810559	Headphone Amp. Circuit Assembly

FM MUTING CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R801, 816, R820	552047222	Carbon Film, 4.7K ±5%, 1/4W
R802, 803, R807, 812	552010222	Carbon Film, 1K ±5%, 1/4W
R804	552010522	Carbon Film, 1M ±5%, 1/4W
R805, 817	552047322	Carbon Film, 47K ±5%, 1/4W
R806	552010322	Carbon Film, 10K ±5%, 1/4W

Schematic Location	Part No.	Description
R808, 810, R811	552033222	Carbon Film, 3.3K ±5%, 1/4W
R809, 818	552022322	Carbon Film, 22K ±5%, 1/4W
R813, 819	552022222	Carbon Film, 2.2K ±5%, 1/4W
R814	552033322	Carbon Film, 33K ±5%, 1/4W
R821	552022122	Carbon Film, 220 ±5%, 1/4W
VR801	510502119	Potentiometer, 1K
VR802, 803	510502125	Potentiometer, 10K

Schematic Location	Part No.	Description
	CAPACITORS	
C801, 802, C804	440100985	Ceramic, 0.01mfd, 250V
C803, 805	440501283	Ceramic, 50pF ±10%, 250V
C806	402100509	Electrolytic, 100mfd, 6.3V
C807	440100835	Ceramic, 0.1mfd, 50V
C808	402470729	Electrolytic, 4.7mfd, 25V
C809	440301183	Ceramic, 300pF ±10%, 250V
C810	441301336	Ceramic, 3pF (N5.6), 50V
	TRANSISTORS	
Q801, 802, Q803, 806	301201117	2SC829C

Schematic Location	Part No.	Description
Q804, 807	301201115	2SC828
	DIODES	
D801, 802	300111008	1S188
D803, 804, D805	300212004	KB-269
L801	226501115	Coil, Muting, 10.7MHz Tune
	770101223	Pin, Terminal
	140800151	Printed Circuit Board, "MU-5"
	141810557	FM Muting Circuit Assembly

RECTIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R901	551010133	Composition, 100 ±10%, 1/2W
R902	553110153	Metal Oxide, 100 ±10%, 2W
R903	551022233	Composition, 2.2K ±10%, 1/2W
	CAPACITORS	
C901	402470519	Electrolytic, 470mfd, 16V
C902	402220419	Electrolytic, 2200mfd, 16V

Schematic Location	Part No.	Description
C903	402470529	Electrolytic, 470mfd, 25V
C904	402470539	Electrolytic, 470mfd, 35V
C905	440100985	Ceramic, 0.01mfd, 250V
Q901	301301122	Transistor, 2SD317
D901	300313007	Diode, BZ-210, Zener
D902	300919005	Diode, 1S1850, Rectifier
	770101223	Pin, Terminal
	140800152	Printed Circuit Board, "B-22"
	141810558	Rectifier Circuit Assembly

CHASSIS PARTS

Schematic Location	Part No.	Description
	RESISTORS	
R001	553122163	Metal Oxide, 220 ±10%, 3W
R002	552033322	Carbon Film, 33K ±5%, 1/4W
R003*	551022533	Composition, 2.2M ±10%, 1/2W
		*used only for the unit with voltage setting at 100 – 120V
	CAPACITORS	
C001	440501388	Ceramic, 5pF ±0.5pF, 250V
C002		Not used
C003	440301388	Ceramic, 3pF ±0.5pF, 250V

Schematic Location	Part No.	Description
C004	442101033	Ceramic, 0.001mfd ±10%, 50V
C005	400220439	Electrolytic, 2200mfd, 35V
	MISCELLANEOUS	
D001	300111008	Diode, 1S188
L001	220001121	Coil, RF choke, 47μH
L002	226501111	Coil, FM Ant. Matching
L003	222391119	Coil, AM Ant.
T001	205001333	Transformer, Power Supply
	321304367	FM Front end
	322420012	Variable Capacitor, AM
M001	231310022	Meter, FM Tuning

Schematic Location	Part No.	Description
M002	231310023	Meter, Signal Strength
S1	614010103	Switch, Power Supply
S3, 4 (1set)	614020402	Switch, Dimmer and MPX Filter
S5	601011242	Switch, Selector
S6	601011243	Switch, Muting
PL1, 2, 3, 4, PL5, 6, 7, 8	352063028	Lamp, 6.3V, 0.28A, Dial Light

Schematic Location	Part No.	Description
PL9, 10, 11, PL12, 13	351080015	Lamp, 8V, 0.15A, Indicator Light
PL14	351140005	Lamp, 14V, 50mA, FM ST. Ind. Light
F001	341220010	Fuse, 1A–3AG, (0.5A–3AG= 341220005= when voltage setting at 220 – 240V)
	151691117	Dial Pointer w/lamp

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